

SURFOM[®] ETHOS 5400

Smart Integration of Liquid Carriers in Biopesticides

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R&D Scientist
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AN INDISPENSABLE MEMBER OF

INDORAMA
VENTURES



Indovinya: Global Footprint

15
manufacturing
locations

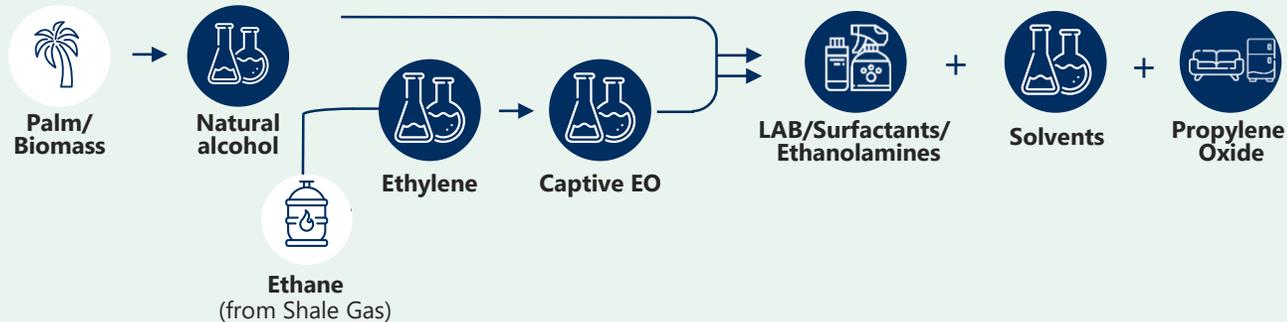
7
R&D
centers

#1
Leading supplier
in Crop Solutions
in the Americas

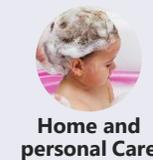
~70%
Biodegradable
Products



Indovinya Value Chain



Key end markets



Crop Solutions

Driving Agricultural Success through tailored formulations & trusted partnerships

We collaborate with research partners, customers, and farmers as a responsive business partner with **regional and global reach**.

Our **expertise, innovation, and dedication** to international quality standards drive increasingly sustainable solutions that improve crop yields.



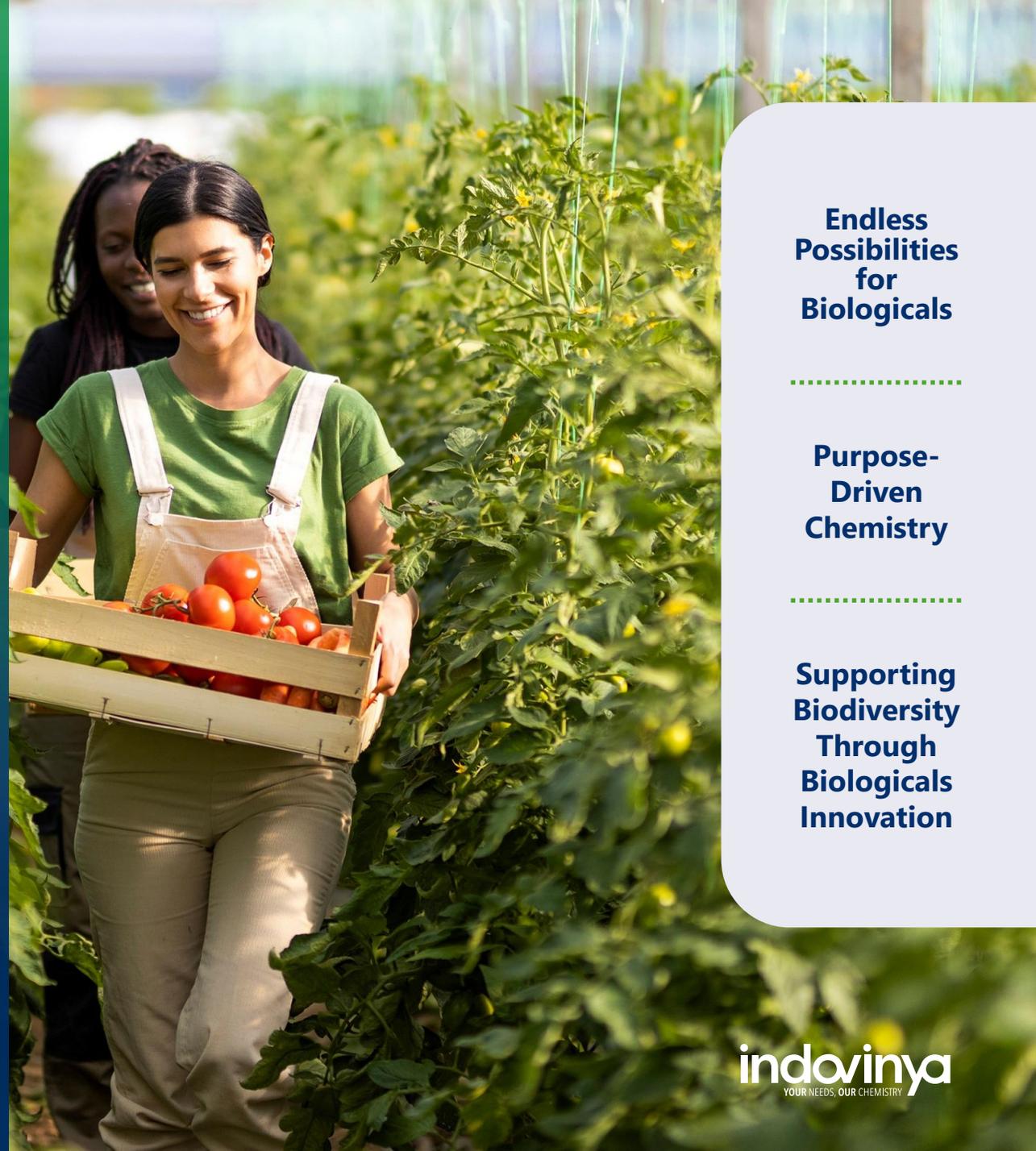
**BEHIND EVERY FARMER
OUR CUSTOMERS
SUPPORT,
WE STAND WITH
THEM**

SURFOM® ETHOS

**Trusted Chemistry,
Pioneering Solutions for a
Biointegrated Future**

SURFOM® ETHOS is built on a partnership-driven approach, collaborating closely with growers, researchers, and industry leaders to advance agricultural innovation.

By leveraging its extensive portfolio, Indovinya brings formulation components and delivery solutions tailored to the specific needs of the field. This commitment fuels the evolution of agriculture, positioning biological products not as alternatives, but as essential components of the field's progress.



**Endless
Possibilities
for
Biologicals**

**Purpose-
Driven
Chemistry**

**Supporting
Biodiversity
Through
Biologicals
Innovation**

indovinya
YOUR NEEDS. OUR CHEMISTRY

SURFOM® ETHOS 5400

Smart Integration of Liquid Carriers in Biopesticides



Extended shelf life

Low water activity, reduces microbial stress, **ensures high stability** and long-term spore survival



Multi-Strain Compatible Platform

Compatible with:
Trichoderma harzianum,
Cordyceps fumosorosea,
and *Beauveria bassiana*



Eco-Conscious Profile

Readily **biodegradable**, non-hazardous, with low toxicity and low volatility for **safer, sustainable** application



Beyond Formulation Performance

Improved **compatibility, wetting,** and **coverage** for reliable in-field delivery

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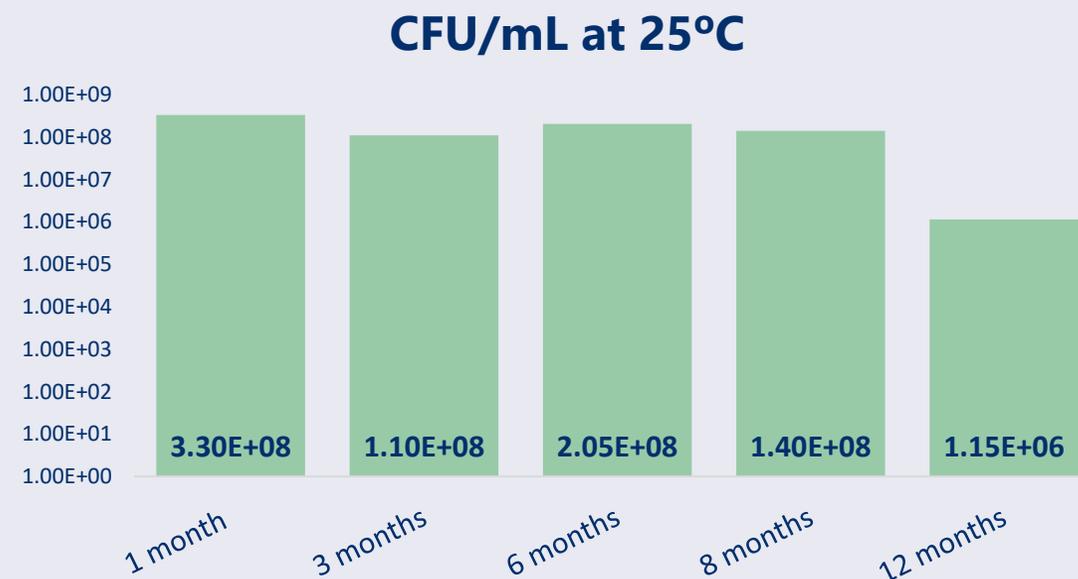
Formulation guide*



Components	Function	% (w/w)
<i>Trichoderma harzianum</i> spores	Active ingredient	5.0%
SURFOM® ETHOS 5400	Liquid carrier	73.0%
Surfactants	Emulsifier/ Dispersant	19%
Fumed silica	Rheology modifier	3.0%



Stability data



*Adjustments may be required depending on the inherent characteristics of the active ingredient.

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Physicochemical Properties

Appearance (25°C): dark green

pH : 7.18

Aqueous 1%, 25°C

Viscosity (25°C): Approx. 90 cP

Spindle 31, 160 rpm, 25°C

Wet sieving (% w/w): 0.36

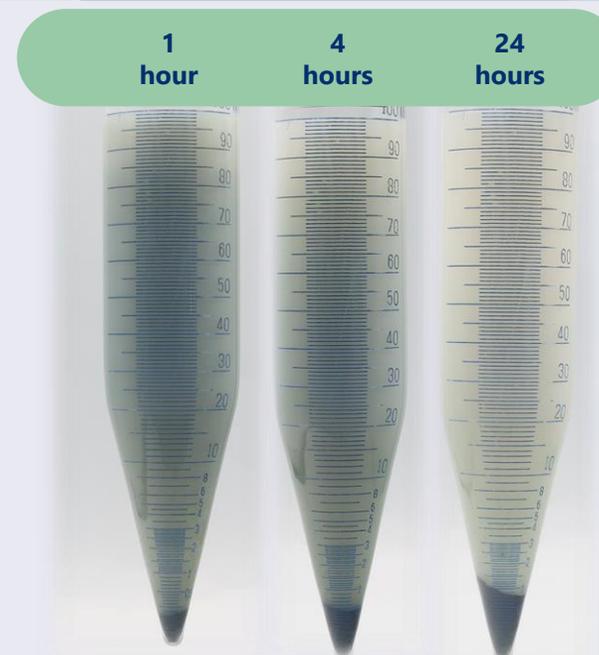
75 µm sieve

Suspensibility (% w/w): 90.93%

Particle size distribution - d50 (µm): 2.93
d90 (µm): 10.2



Emulsion Stability*



< 1 mL spores sedimentation after 24h, **easily redispersible**

*1% v/v in water 20 ppm



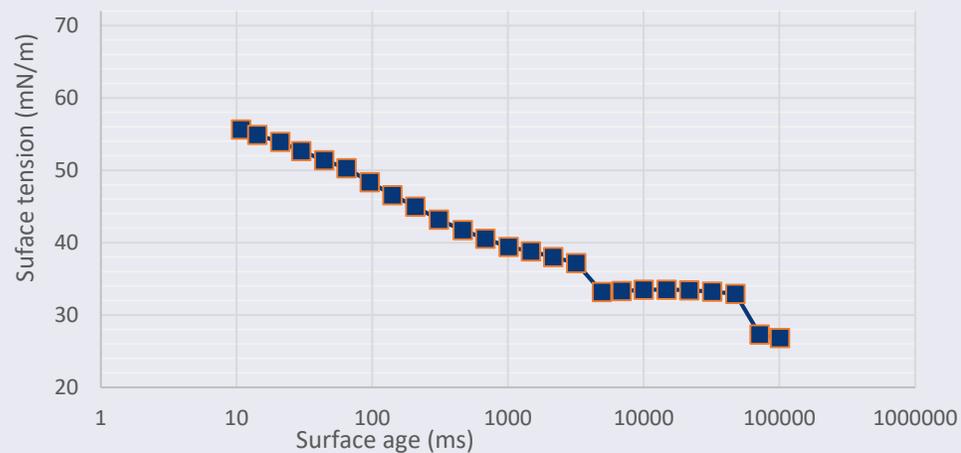
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Smart Integration of Liquid Carriers in Biopesticides



Application Assessment

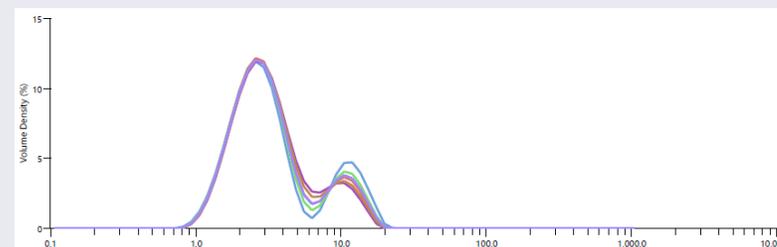
Dynamic Surface Tension



Contact angle: 56.2°
Flat, parafilm, ellipse fitting method



Particle size distribution
d50 (µm): 2.93
d90 (µm) : 10.2
Fraunhofer particle size analysis



Spray Chamber
Oxford VisiSize system (Nozzle XR 11002, 1 bar)

DMV 128 µm
V100 12%
Span 1.2



Biosolutions

Enhancing biopesticides with smart formulation solutions

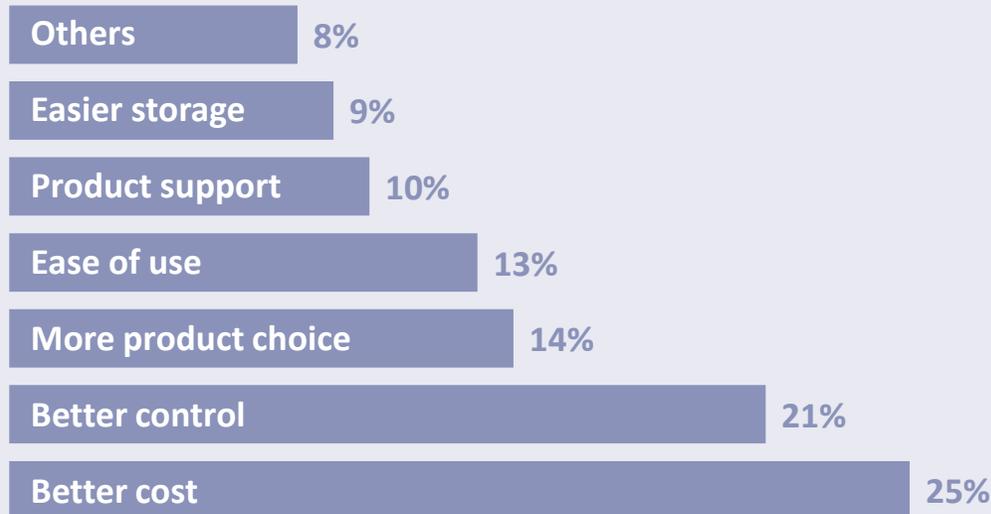


Despite strong IPM incentives, the global adoption of biopesticides remains below the full potential of these technologies, with advanced formulations key to unlocking consistent field performance.

WHY TAILORED SOLUTIONS FOR BIOPESTICIDES MATTER

FARMER'S SENTIMENT ON WHAT FEATURES WOULD ACCELERATE ADOPTION

Based on Agbioinsight qualitative research



To improve biopesticides' field control, shelf life, and storage conditions—and diversify the market portfolio—carefully selected additives ensure compatibility, stability, and efficacy without compromising biological performance.

Biosolutions

Accelerating Biopesticide Regulation with Safe Coformulants



Using safe, well-known coformulants reduces toxicological hurdles, helping regulators focus on active ingredients. This speeds up approvals and simplifies compliance for biopesticide products.

SURFOM® ETHOS 5400: Solutions that support safer, compliant formulations

- **KEY CHALLENGE:**
 - Ensuring product consistency and environmental safety in biological formulations
- **BRAZIL AS A CASE STUDY:**
 - Fast market growth driven by updated legislation
 - Authorities worked closely with companies
 - Demonstrates how collaboration accelerates innovation
- **MOVING FORWARD:**
 - Our technologies help simplify the regulatory process
 - But the regulatory process must also evolve to keep pace with innovation

The right partner for Biosolutions Innovation

Indovinya is empowered with high-end equipment, precision techniques, and passionate people to develop unique solutions to our customers, ensuring productivity and success in the field

Formulation Technology for Liquid and Solid Formulations



Mixture, Dispersion
and Stability



Milling



Extrusion



Granule Drying

Physico-Chemical Assessments



Particle Size Study (micro and nano)



Surface Tensiometry



Rheology Behavior



Particle Size Study (micro and nano)



Application Expertise



Microbiology, Fermentation

Development Accelerators



Digital & Advanced Technology Park
HTP system
Predictive models powered by AI



Pilot Plant for Scale Up
Brail, USA and India

Biotech Capabilities



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R&D Scientist



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